

A PRELIMINARY LIST OF THE MOSSES OF THE ANIMAS MOUNTAINS, THE OLD GRAY RANCH, HIDALGO COUNTY, NEW MEXICO

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Abstract. A preliminary checklist of the mosses of the Animas Mountains on the old Gray Ranch was created in early April 2019 over a five-day period by researchers Jason Brooks, John Brinda, Kelly Allred, and Russell Kleinman. In total, 20 families, 51 genera, and 82 species were found. Five new species to the state of New Mexico were found: *Campylopus tallulensis* Sull. & Lesq., *Entosthodon rubrisetus* (E.B. Bartram), *Entosthodon sonora* (Cardot) Steere, *Gemmabryum subapiculatum* (Hampe), and *Syntrichia ammonsiana* (H.A. Crum & L.E. Anderson) Ochyra.

Introduction

The old Gray Ranch is located in the bootheel region of New Mexico in Hidalgo County. The ranch extends from the Mexican border northward to just south of the northern extent of the Animas Mountains and includes almost the entire Animas Mountain Range. In addition, the ranch includes the grasslands on the west side of the Animas Mountains including some lands on the west side of State Highway 338. The ranch is 321,000 acres in size and covers 502 square miles, making it one of the largest ranches in the state of New Mexico.

The Gray Ranch has an interesting legacy of both cattle ranching and environmental protection and was first homesteaded in 1880 by former Texas Ranger Michael Gray and his family. The Gray family established a small cattle operation on the west side of the range and ranched there for two years. In 1882, this small family ranch was sold to a group of investors led by George Hearst and became the Victorio Land and Cattle Company. From then on it would be popularly known by its brand, the Diamond A. From this point forward and lasting decades, the ranch grew remarkably acquiring smaller ranches and creating a massive cattle operation. At its largest, the Diamond A extended from the Mexican border to near Silver City, New Mexico and east to Lake Valley, New Mexico and included a disjunct property, the Armendaris Ranch, which surrounded the present-day town of Engle, New Mexico. In 1967, the ranch was sold, along with other holdings in California, and in 1968 it began to be liquidated. In 1970, a piece of the Gray Ranch that is very similar to its current footprint was purchased by Wayne Pruett, Peter Wray, and, later, investor Pablo Brener. In 1990, it was sold to the Nature Conservancy and placed into conservation; however, by 1994, it was again sold, this time to poet and rancher Drummond Hadley who formed the non-profit Animas Foundation that administers the property to this day. Today, the ranch is in a semi-conservation state with minimal cattle ranching and employs the ethic of a “working wilderness.” (Hilliard 1996).

The Study Area

The study area for this effort focused on the north central Animas Mountains. Due to the large size and xeric nature of the sampling area, we decided to focus our work on areas that would garner the largest number of bryophyte species. With this in

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mind, we focused on canyons with at least some water, such as Indian Creek, just north of Animas Peak, as well as two east-west-facing canyons: Pine Canyon, located on the east side of the Animas Mountains south of Animas Peak, and Last Chance Draw, a very steep and rocky canyon on the west side of the range just below Victorio Peak. The survey preferred canyons with an east-west orientation because they contain north-facing walls that remain cooler in summer months due to increased shade and thereby had much greater abundance of bryophytes than substrates of different aspects. In addition, we were able to summit Animas Peak and briefly survey it and a surrounding ridgeline; however, no bryophytes were found as the environment is simply too harsh.

Plant Communities

The Animas Mountains have an elevational range between 4500' and 8520' on Animas Peak. Our study area primarily focused on elevations above 5400', where we identified three main vegetation communities, lower encinal, upper encinal, and mixed conifer forest (Wagner 1977). This community can be further divided into the lower and upper encinal communities (Wagner 1977). The lower encinal community occurs in areas at the base of the mountains and canyons that contain little relief. At the base of foothills, this community is often park-like with stands of *Quercus arizonica* and *Quercus emoryi* and occasional *Juniperus deppeana*; in canyons, *Pinus cembroides*, *Quercus hypoleucoides*, *Quercus rugosa*, and *Quercus grisea* occur in varying amounts. Understory varies from rocky unvegetated soils to open savannah with species such as *Muehlenbergia emersleyi*, *Bouteloua curtipendula*, *Bouteloua gracilis*, and *Aristida schiedeana*. Upper encinal occurs in canyons and on slopes with much greater relief than lower encinal. Elevations for the upper encinal range from 6200' to 6900'. This community varies from a closed-canopy mixed pine-oak woodland of *Quercus rugosa* and *Quercus hypoleucoides* (mesic sites), *Pinus cembroides*, and *Juniperus deppeana* to dense and short-statured 'oak chaparral' with shrubby oaks and species such as *Arctostaphylos pungens* and *Cercocarpus montanus* occurring frequently with shrubby oaks. Much of the oak chaparral appears to represent a post-burn community. In both lower and upper encinal, cacti and yucca are common though occasional and species such as *Agave palmeri*, *Yucca madrensis*, *Dasyllirion wheeleri*, *Nolina* sp., *Cylindropuntia spinosior*, and *Opuntia phaeacantha* can be found regularly.

On the north side of Animas Peak above 6800' is a mixed conifer forest, though a significant burn in the recent past resulted in a very small relic stand of conifers. In the prominent drainage of Animas Peak, species such as *Pseudotsuga menziesii*, *Pinus arizonica*, and *Pinus leiophylla* mix with a large stand of *Quercus gambelli* and a small patch of regenerating *Populus tremuloides*. Understory here contains significant shrub growth primarily of *Robinia neomexicana* and *Symphoricarpos rotundifolius*.

Methodology

All specimens were collected in bryophyte packets with relevant data to the collection written on the packet. All specimens collected during the field effort have been vouchered and placed in herbaria. Most of the specimens are located at the California Academy of Sciences (CAS) and Missouri Botanical Garden (MO) with many also at New Mexico State University (NMCR) and Western New Mexico University (SNM).

Results

In total, 82 bryophyte species were recorded during the survey representing 20 families and 51 genera. From the collections it was determined that five species were previously unknown to the state of New Mexico and 27 are very rare, all with fewer than 10 state records. Species accounts for the five species that are new records to the state are included below. In addition, two undescribed members of the genus *Schistidium* were found in both Indian Creek and Pine Canyon. Both species have been noted before in New Mexico as well as in west Texas, Arizona, and southern Nevada (pers. comm. John Brinda).

Another interesting result from our study was the discovery of a fertile specimen of *Pseudocrossidium replicatum* (Jason Brooks 2081, CAS). Thought only to produce sporophytes in Mexico, our collection represents the first fertile specimen found in the United States.

Botany is the natural science that transmits the knowledge of plants.

— *Linnaeus*



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New State Records

Campylopus tallulensis Sull. & Lesq. Records for the species place it in the southeastern and midwestern United States as well as central and southern Mexico, with occurrences also in Columbia, Ecuador, and Peru; however, Arizona, California, Oregon, and Canada each contain a single occurrence.

Specimen Examined: U.S.A.: **New Mexico: Hidalgo County:** East side of Animas Mountains in small un-named side canyon of Pine Canyon roughly ¼ mile southwest of Gibson Tank in mixed oak-pine habitat, N31.548533° W108.735251°, on soil in rock crevice along a dry creek bed, 5958' (1860 meters [m]), 6 April, 2019, *Jason Brooks 2027* with John Brinda (CAS, California Academy of Sciences Herbarium). Identification confirmed by John Brinda and David Toren.

Entosthodon rubrisetus (E.B. Bartram). This species is found on sandy soils in canyons and desert washes. Records for this species occur in southern California in the Sierra Nevada Mountains and in Arizona where the type specimen is described from Sycamore Canyon in the Baboquivari Mountains, Arizona (Bartram 1928).

Specimens Examined: U.S.A.: **New Mexico: Hidalgo County:** Diamond A Ranch/old Gray Ranch north of Cloverdale, north slope of Animas Mountains, climbing west out of Indian Creek; N31.604295° W108.774819°, 6140' (1871m), 4 April, 2019, *Russell Kleinman 2019-4-4-3a* (SNM, Western New Mexico University). Identification confirmed by Russel Kleinman.

Entosthodon sonorae (Cardot) Steere. This small species is found on mineral soils under rocks in at least partial shade at moderate to high elevations. The type locality of this species is from the Altar Valley of Sonora in northern Mexico. Since its description in 1928 (Bartram 1928), only six records have been recorded from Mexico and one record from Big Bend National Park in Texas.

Specimen examined: U.S.A.: **New Mexico: Hidalgo County:** Animas Mountains. West side of Indian Creek on slope in grassland, 711008E; 3498695N 6190' (1886m), 4 April, 2019 *Jason Brooks 2100* (CAS). Identification confirmed by David Toren.

Gemmabryum subapiculatum (Hampe) J.R. Spence & H.P. Ramsay. This species is found on disturbed dry or damp soil, soil over rock, and agricultural fields from low to high elevations. This species currently is known primarily from California with outlier populations found in both Colorado and New Hampshire. In the Animas Mountains one occurrence was found just past the end of Indian Creek road on the west slope of the canyon just above a small trail on dry soil.

Specimen examined: U.S.A.: **New Mexico: Hidalgo County:** Diamond A Ranch/old Gray Ranch north of Cloverdale, north slope of Animas Mountains, on slope west of Indian Creek; N31.607222° W108.774591°, 5935' (1809m), 4 April 2019 *Russell Kleinman 2019-4-4-4* (SNM). Identification confirmed by Russell Kleinman.

Syntrichia ammonsiana (H.A. Crum & L.E. Anderson) Ochyra. This small species is typically found on rock walls usually in deep shade. The species was described originally in West Virginia and since then its distribution in the United States has been limited to North Carolina and Tennessee. This species also has a small global distribution with occurrences in South Africa and a handful of occurrences in South America in both Bolivia and Peru (Gallego 1981).

Specimen examined: U.S.A.: **New Mexico: Hidalgo County:** Along unnamed branch of Pine Canyon southwest of Gibson Tank, Animas Mountains, N31.548533° W108.735251°, 6102' (1860m), 6 April, 2019, *John Brinda 13044* (MO, Missouri Botanical Garden). Identification confirmed by John Brinda.

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Literature Cited

- Allred, K.W. 2012. *Flora Neomexicana III a: Field Keys*. Morrisville, NC: Lulu Press.
- Allred, K.W. 2015. A Comparison of the Mosses Known and Reported for New Mexico with Flora North America, and a Current Catalog of the Mosses of New Mexico. *The New Mexico Botanist*. No. 62, 24 Feb., 2015, 14pp.
- Allred, K.W., R. Kleinman, K. Blisard. 2018. Preliminary Guide to the Bryophytes of New Mexico. Las Cruces, NM. Self-published.

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- Bartram, E.B. 1928. Studies in *Funaria* from Southwestern United States. *The Bryologist*. Vol. 31, No. 5, Sept. 1928, pp. 89-96.
- Bezy, R.L., C.J. Cole. 2014 Amphibians and Reptiles of the Madrean Archipelago of Arizona and New Mexico. *American Museum Novitates*. No. 3810, 30 July 2014, 23pp.
- Bourgeron, P.S. et al. 1995. Assessing the Conservation Value of the Gray Ranch: Rarity, Diversity and Representativeness. *Desert Plants*. Vol.11, No.2-3, March 1995, 45pp.
- Brinda, J., personal communication, "Re: Animas Mountains Mosses," message to Jason Brooks, 21 Feb. 2020. E-mail.
- Brown, D.E. 1994. Biotic communities: southwestern United States and northwestern Mexico. Salt Lake City: University of Utah Press.
- Bryophyte Flora of North America. 2007. Electronic flora, accessed at: http://www.efloras.org/flora_page.aspx?flora_id=50
- Consortium of North American Bryophyte Herbaria (CNABH). Electronic database, accessed at: <https://bryophyteportal.org/portal/>
- Gallego, M.T., J.G. Montes. 1981. *Syntrichia ammonsiana* (Pottiaceae), new to South America. *The Bryologist*. Vol 109, No. 2, Apr. 1981. pp 236-238.
- Greven, H.C. 2003. *Grimmias of the world*. Leiden: Backhuys press.
- Hilliard, G. 1996. *A Hundred Years of Horse Tracks: The Story of the Gray Ranch*. Silver City, New Mexico: High Lonesome Books.
- Hubbard, J.P. 1977. A biological inventory of the Animas Mountains, New Mexico Department of Game and Fish, Santa Fe. 56pp.
- Ireland Jr., R.R. "*Campylopus tallulensis*" In: *Bryophyte Flora of North America*. Electronic flora, accessed at: http://www.efloras.org/florataxon.aspx?flora_id=50&taxon_id=242443587
- Kleinman, R. and K. Blisard. *Plants of the Gila Wilderness-Bryophytes*. Accessed at: <https://wnmu.edu/academic/nspages/gilaflora/bryophytes.html>
- Maier, E. 2010. The Genus *Grimmia* Hedw. *Boissiera*. Vol. 63.
- Sharp, A.J., H. Crum, P.M. Eckel. 1994. *The Moss Flora of Mexico*. Bronx, New York. The New York Botanical Garden.
- Wagner, W. 1977. Floristic affinities of Animas Mountain, southwestern New Mexico. Master's thesis, University of New Mexico. Albuquerque. 180pp.

The Catalog

Notes

Bold = State record

* = Rare

BRYOPHYTA

Family AMBLYSTEGIACEAE

*Campyliadelphus chrysophyllus** (Brid.) Kanda

Campylopus tallulensis Sull. & Lesq.

Cratoneuron filicinum (Hedwig) Spruce, Cat. Musc.

Hygroamblystegium tenax (Hedw.) Jennings

Family ANOMODONTACEAE

*Anomodon rostratus** (Hedw.) Schimp.

Family BARTRAMIACEAE

Bartramia sp.

Philonotis sp.

Family BRACHYTHECIACEAE

Brachytheciastrum cf. *fendleri* (Sull.) Ochyra & Żarowiec

Brachytheciastrum velutinum (Hedw.) Ignatov & Huttunen

Brachythecium cf. *albicans*

Torrentaria aquatica (A. Jaeg.) Ochyra (= *Rhynchostegium aquaticum* A. Jaeger)

Family BRYACEAE

Bryum argenteum Hedw.

Gemmabryum subapiculatum (Hampe) J.R. Spence & H.P.

Ramsay

Imbriobryum sp.

Plagiobryoides sp.

Ptychostomum cf. *pseudotriquetrum** J.R. Spence & H.P.

Ramsay ex Holyoak & N. Pedersen

Rosulabryum andicola (Hook.) Ochyra

Family DICRANACEAE

Dicranoweisia cirrata (Hedw.) Lindb. ex Milde

Dicranum rhabdocarpum Sull.

Family DITRICHACEAE

Ceratodon cf. *purpureus* (Hedwig) Bridel

Family ENCALYPTACEAE

*Encalypta vulgaris** Hedw.

Encalypta cf. *ciliata* Hedwig, Sp. Musc. Frond.

Family ENTODONTACEAE

Entodon cf. *beyrichii* (Schwagrichen) Müller Hal

Family FABRONIACEAE

Fabronia ciliaris (Brid.) Brid.

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Family FISSIDENTACEAE

Fissidens bryoides Hedw.

Fissidens crispus Mont.

Fissidens sublimbatus Grout

Family FUNARIACEAE

Entosthodon rubrissetus (E.B. Bartram) Grout

Entosthodon sonora (Cardot) Steere

Funaria americana Lindberg, Öfvers

Funaria hygrometrica Hedw.

Family GRIMMIACEAE

Coscinodon cribrosus (Hedw.) Spruce

*Grimmia alpestris** (F. Weber & D. Mohr) Schleich

Grimmia arizonae Renauld & Cardot

Grimmia crinitoleucophaea Cardot

*Grimmia laevigata** (Brid.) Brid.

Grimmia longirostris Hook.

Grimmia montana Bruch & Schimp.

Grimmia pilifera Beauv.

Grimmia pulvinata (Hedw.) J.E. Smith

*Schistidium atrofusum** (Schimp.) Limpr.

*Schistidium confertum** (Funck) Bruch & Schimp.

*Schistidium rivulare** (Brid.) Podp.

Schistidium sp. A

Schistidium sp. B

Family HEDWIGIACEAE

*Braunia secunda** (Hook.) Bruch & Schimp.

Hedwigia ciliata (Hedw.) Beauv. (s.lat.)

Family HYPNACEAE

Homomallium mexicanum Cardot

Roaldia revoluta (Mitt.) P.E.A.S. Câmara & M. Carvalho-Silva

Platygyrium fuscoluteum Cardot

Family LESKEACEAE

*Haplocladium angustifolium** (Hampe & Müll.Hal.) Broth.

*Haplocladium microphyllum** (Hedw.) Broth.

Lindbergia mexicana (Besch.) Cardot

Family MIELICHHOFFERACEAE

Pohlia nutans (Hedw.) Lindb.

Family ORTHOTRICHACEAE

Orthotrichum anomalum Hedw.

Orthotrichum diaphanum Brid.

Family POTTIACEAE

Bryoerythrophyllum recurvirostrum (Hedw.) P.-C. Chen.

Didymodon rigidulus Hedw.

Didymodon tophaceus (Brid.) Lisa

*Leptodontium flexifolium** (Dicks.) Hampe

*Molendia sendtneriana** (Bruch & Schimp.) Limpr.

*Phascum cuspidatum** Hedw.

*Pottia bryoides** (Brid.) Mitt.

*Pseudocrossidium replicatum** (Taylor) R.H. Zander

Rhexophyllum subnigrum (Mitt.) Hilp.

Syntrichia ammonsiana (H.A. Crum & L.E. Anderson) Ochyra

*Syntrichia bartramii** (Steere) R.H. Zander

*Syntrichia chisosa** (Magill, Delgadillo & Stark) R.H. Zander

*Syntrichia fragilis** (Taylor) Ochyra

Syntrichia laevipila Brid. (=pagorum)

*Syntrichia montana** Nees (=virescens)

*Syntrichia obtusissima** (Müll. Hal.) R.H. Zander

Syntrichia ruralis (Hedw.) F. Weber & D. Mohr

*Tortella humilis** (Hedw.) Jennings

*Tortella tortuosa** (Hedw.) Limpr.

*Tortula brevipes** (Lesq.) Broth.

Tortula inermis (Brid.) Mont.

Trichostomum sp.

Weissia controversa Hedw.

Weissia ligulifolia (E.B. Bartram) Grout

*Weissia phascopsis** R.H. Zander

Family PTCHOMITRIACEAE

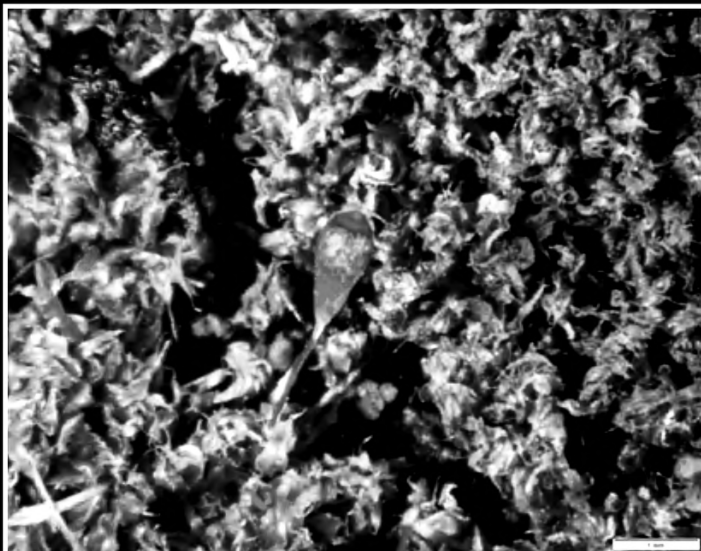
*Ptychomitrium sinense** (Mitt.) A. Jaeg.



Campylopus tallulensis. This photo is not in situ, the plant was found under a large boulder. Photo: Jason Brooks



Campylopus tallulensis habitat. The plant was found under the large boulder just past the backpack. Photo: Jason Brooks



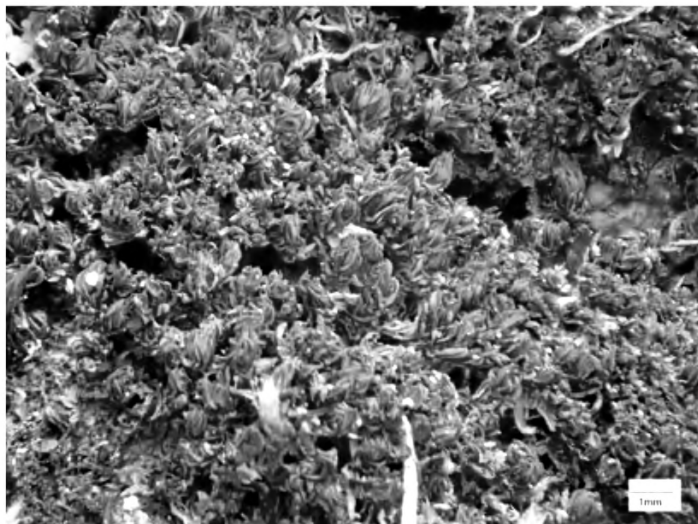
Entosthodon rubrisetus. Photo: Russell Kleinman.



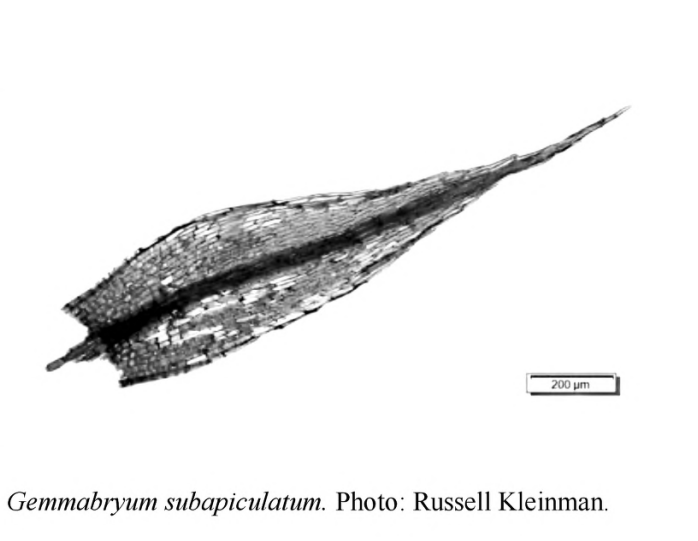
Close up of *Entosthodon rubrisetus*. Photo: Russell Kleinman.



Habitat photo for both *Entosthodon rubrisetus* and *E. sonorensis*. Both species were found under small rocks within grassland. Photo: Jason Brooks



Syntrichia ammonsiana in situ on north facing rock outcrop. Photo: Jason Brooks.



Gemmabryum subapiculatum. Photo: Russell Kleinman.